REMARKS

Claims 1-28 are pending in the case. The Examiner rejected claims 1-8, 10, 14-18, 21, 23, 25, and 27-28 under 35 U.S.C. §102(b) as anticipated by Japanese Patent No. 11-175919 (hereinafter "JP '919"). The Examiner rejected claims 9, 11-13, 22, 24 and 26 under 35 U.S.C. §103(a) as being unpatentable over JP '919 in view of U.S. Patent No. 6,493,196 to Noma et al. (hereinafter "Noma"). The Examiner rejected claim 28 under 35 U.S.C. §103(a) as being unpatentable in view of JP '919 and U.S. Patent No. 6,515, 838 to Gill (hereinafter "Gill"). The Examiner objected to claims 19 and 20, but notes that these claims would be allowable if rewritten in independent form. The claims are believed to be in condition for allowance, and applicant respectfully requests the prompt allowance of claims 1-28. In support of the technical remarkds presented below, Applicant is submitting a declaration under 37 CFR §1.132 from the primary inventor with this paper.

REJECTION OF CLAIMS 1-8, 10, 14-18, 21, 23, 25, AND 27-28 UNDER 35 U.S.C. §102(b)

The Examiner rejected claims 1-8, 10, 14-18, 21, 23, 25, and 27-28 under 35 USC §102(b) in view of JP '919. This rejection is respectfully traversed.

It is well settled that under 35 U.S.C. §102 "an invention is anticipated if . . . all the claim limitations [are] shown in a single art prior art reference. Every element of the claimed invention must be literally present, arranged as in the claim. The identical invention must be shown in as complete detail as is contained in the patent claim." *Richardson v. Suzuki Motor Co., Ltd.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). Only if each limitation is literally disclosed by the prior art reference is the claim anticipated.

Claims 27 and 28 each recite, in pertinent part, "the pinning layers comprising at least two antiferromagnetic (AFM) films selected from the **same** Mn-based alloy system." Representative claim 1 recites, "pinning layers disposed to one side of the reference layer, the pinning layers comprising at least two antiferromagnetic (AFM) Ni-Mn films." By reciting the elements, Ni-Mn or Pt-Mn as in claim 14, claims 1 and 14 also specifically require that the two AFM films come from the same Mn-based alloy system.

The Examiner asserts that "even though JP '919 does not require the two AFM layers to be of the same Mn-based alloy system JP '919 certainly does not exclude the possibility that both AFM layers are of the same Mn-based alloy system." *See* last Office Action, page 5. Applicant asserts that by this statement the Examiner acknowledges that JP '919 does not literally teach every element of the claimed invention as required under 35 USC §102 for anticipation.

Furthermore, the "*possibility* that both AFM layers (films – as used in the claims) are of the same Mn-based alloy system" is neither taught, suggested, or enabled under JP '919 such that one of ordinary skill in the art could appreciate the significant advantages of both AFM films actually *being* of the same Mn-based alloy system without undue experimentation. JP '919 simply discloses Mn-based alloys that may, or may not, be of the same alloy system for both films.

In order for one of ordinary skill in the art to identify this teaching, which is explicitly claimed in the present invention, one of ordinary skill must try all of the combinations in the broad listing of elements presented by JP '919. There is no suggestion or motivation in JP '919 to specifically use both AFM films from the same Mn-based alloy system. Furthermore, there is no motivation or suggestion to use AFM films that are both from the Ni-Mn or the Pt-Mn alloy system. Therefore, every element of the claimed invention is not literally present, arranged as in the claim. *Richardson v. Suzuki Motor Co., Ltd.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). The identical invention is not shown in as complete detail as is contained in the patent claim. *Id.*

JP '919 discloses "the Mn alloy of the first anti-ferromagnetic layer includes more than one kind[s] of elements selected from the group of Pt, Ni, Rh, Ru, Au, and Pd. The Mn alloy of the second anti-ferromagnetic layer includes more than on[e] kind of elements selected from the group of Pt, Ni, Ir, Rh, Ru, Co, Fe and Pd." JP '919 specifically discloses a first group of six elements (Pt, Ni, Rh, Ru, Pd, and Au) and a second group of eight elements (Pt, Ni, Rh, Ru, Pd, Ir, Co, and Fe). There are six possible combinations for the first film and eight combinations for the second film for a total of forty-eight combinations among the two films. Five of these combinations have the two films from the same alloy system and only two of these five comprise two films of the same Mn-Ni or Mn-Pt alloy system.

Applicant submits that, with no motivation, suggestion, or teaching to use two films of the same Mn-Ni or Mn-Pt alloy system, one of skill in the art must conduct undue experimentation before discovering the alloy system combinations taught in the present invention. In this art research is conducted in a highly controlled environment. This technology involves materials in which the composition is measured and determined very precisely at an atomic level. Furthermore, these experiments are often very costly. Prior to conducting such experiments, funding and authorization must be obtained. Materials alone may be so costly as to prevent experimentation with each of the forty-eight combinations. In addition, testing and data collection after the experiment is conducted only add to the high costs.

Typically, to conduct these combination experiments a target material is sputtered onto a substrate. A sample of sufficient size to conduct this sputtering can be very expensive. For example, a target of Pt-Mn can cost as much as $75,000. Alternatively, using a pure manganese target and platinum chips to form a film costs about $8,000. A target of Ir-Mn can cost as much as $37,000.

Consequently, producing GMR sensors with AFM films for each of the forty-eight combinations to arrive at the claimed pinning layer can be very expensive and time consuming. As a result, successive failed attempts would likely halt the research due to cost and time constraints before the advantages of using two films of the same Mn-Ni or Mn-Pt alloy system are discovered. A technical discussion of why these experiments would fail is included in the declaration being submitted herewith. *See* declaration.

Furthermore, it is important to note that the first film is in contact with the reference layer and the first and second films are in contact with each other. Therefore, to ensure a high blocking temperature, maximum corrosion resistance, and optimal exchange coupling the first film and second film should be from the same ordered-phase alloy to ensure that the crystaline lattices of the two films match. If the alloy system for the first and second film are not the same, the lattice of organized atoms of the first film is not matched to the lattice of atoms of the second film. Mismatched lattices between the first AFM film and second AFM film degrades the interface between the pinning layer comprising the first film and second film and the reference layer in contact with the first film. The degraded interface results in poor or absent exchange

coupling and degraded pinning fields within the spin-valve sensor. *See* declaration submitted herewith.

In addition JP '919 teaches that the first film is from an ordered alloy system and the second film is from a disordered alloy system. Use of ordered and disordered alloy systems has been shown to adversely affect desired characteristics such as a high blocking temperature, maximum corrosion resistance, and optimal exchange coupling (described in detail in the specification at page 3, lines 17-23, page 4, lines 5-16, and page 3, lines 8-16). *See* declaration submitted herewith.

Regarding claims 3-7 and 16-18, representative claim 3 recites that "the first AFM film has a higher Mn content than the second AFM film." Again, the Examiner points to a *possibility* that such a combination may be formed under JP '919 because the ranges recited in JP '919 a first layer having Mn content between 40-60% and a second layer having Mn content between 50-95%. However, this possibility does not give rise to a teaching that "the first AFM film has a higher Mn content than the second AFM film." Based on the content ranges taught in JP '919, JP '919 gives just as much weight, "teaching," and credibility to the idea that the first AFM film has less Mn content than the second AFM film. Therefore, JP '919 fails to teach exactly what is recited in claims 3-7, and 16-18.

Applicant respectfully asserts that JP '919 fails to teach or disclose pinning layers specifically comprised of at least two AFM films each selected from the same Mn-based alloy system, in particular, a two element alloy system such as Ni-Mn and Pt-Mn, as claimed. This assertion has been acknowledged by the Examiner in the most recent Office Action. Applicant asserts that a possibility or likelihood in the prior art does not rise to the level of a teaching, particularly in an art where very minor changes on an atomic level can have dramatic effects. Applicant respectfully submits that independent claims 1, 14, 27, and 28 are patentably distinct from the cited reference. In addition, claims 7-8, 10, 15-18, 21, 23, and 25 depend directly or indirectly from claims 1, 14, 27, and 28. Accordingly, Applicant also respectfully submits that these dependent claims are likewise patentably distinct for at least the same reasons.

REJECTION OF CLAIMS 9, 11-13, 22, 24, 26 and 28 UNDER 35 U.S.C. §103(a)

The Examiner rejected claims 9, 11-13, 22, 24 and 26 in view of 'JP '919 and Noma. The Examiner also rejected claim 28 in view of 'JP '919 and Gill. These rejections are respectfully traversed.

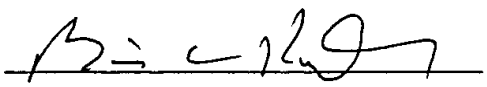
The Examiner bears the initial burden of establishing a *prima facie* case of obviousness. *See* MPEP § 2142. To establish a *prima facie* case of obviousness, the combination of the prior art references must teach or suggest all the claim limitations. MPEP § 2142.

Applicant asserts that the combination of JP '919 and Noma fail to teach or suggest all the claim limitations of the independent claims 1, 14, 27, and 28. Specifically, JP '919 fails to teach or disclose pinning layers comprised of at least two AFM films each selected from the same Mn-based alloy system, in particular, a two element alloy system such as Ni-Mn and Pt-Mn. Applicant respectfully asserts that two AFM films from the same Mn-based alloy system in the claimed invention is not taught or suggested in JP '919. While JP '919 does not foreclose the possibility of the AFM films being from the same Mn-based alloy system, JP '919 does not specifically teach this teaching.

Claims 9, 11-13, 22, 24, and 26 depend directly or indirectly from the independent claims 1 and 14. Accordingly, Applicant respectfully asserts that these claims are also allowable because the claim limitation missing in claims 1 and 14 is also missing in these dependent claims. Consequently, Applicant respectfully asserts that JP '919 combined with Noma and Gill fail to teach or disclose all of the elements of claim 1, specifically, two AFM films from the same two-element Mn-based alloy system.

In view of the foregoing, Applicant submits that the application is in condition for immediate allowance. In the event any questions or issues remain that can be resolved with a phone call, the Examiner is respectfully requested to initiate a telephone conference with the undersigned.

Respectfully submitted,



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